

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re the Application of: **Seiro YAHATA et al.**

Serial Number: **08/701,457**

Filed: **August 22, 1996**

For: **ANTENNA FOR TRANSPONDER AND TRANSPONDER**



Group Art Unit: **2821**

Examiner: **M. Wimer**

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APPEAL BRIEF

Assistant Commissioner of Patents
Washington, D.C. 20231

DEC 3 1999

Sir:

This is an appeal from the Office Action of the Examiner dated JULY 22, 1998, (Paper No. 8) in which claims 1-5, 8-12, 14, 15, 17-29 and 31-36 were finally rejected.

A Notice of Appeal and a Petition for Extension of Time were timely filed on December 21, 1998.

I. REAL PARTY IN INTEREST

The real party in interest is the assignee of the subject application, which is:

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Chiyoda-ku, Tokyo, Japan

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II. RELATED APPEALS AND INTERFERENCES

Appellants know of no other appeals or interference proceedings related to the present appeal.

III. STATUS OF CLAIMS

Claims 1-5, 8-11, 19-29 and 36 were rejected under 35 USC §103(a) as unpatentable over U.S. Patent 5,408,243 to D'Hont (hereinafter "**D'Hont**") in view of U.S. Patent 3,031,667 to Wennerberg (hereinafter "**Wennerberg**"), U.S. Patent 3,495,264 to Spears (hereinafter "**Spears**"), or U.S. Patent 3,750,180 to Fujimoto et al. (hereinafter "**Fujimoto et al.**").

Claims 12, 14, 15, 17 and 18 were rejected under 35 USC §103(a) as unpatentable over U.S. Patent 4,937,586 to Stevens et al. (hereinafter "**Stevens et al.**") in view of U.S. Patent 4,879,570 to Takizawa et al. (hereinafter "**Takizawa et al.**") and **D'Hont**.

Claims 32-35 were rejected under 35 USC §103(a) as unpatentable **D'Hont** in view of **Stevens et al.** and **Takizawa et al.**

IV. STATUS OF AMENDMENTS

An Amendment After Final Rejection was filed November 23, 1999 along with a Petition for Extension of Time amending claims 12 and 19 to overcome an outstanding 35 USC §112, second paragraph rejection.

An Advisory Action was mailed out on December 11, 1999 indicating that the amendments to claims 12 and 19 would be entered, thereby overcoming the 35 USC §112, second paragraph, rejection of claims 12, 14, 15, 17 and 18.

V. CLAIMS ON APPEAL

A clean copy of claims 1-5, 8-12, 14, 15, 17-29 and 31-36 on appeal is attached hereto as Exhibit A.

VI. SUMMARY OF THE INVENTION

The present invention is directed to transponders and antennas for use therewith. In particular, the present invention relates to a transponder and an antenna operating at a frequency of 40-200 kHz, or a frequency greater than 100 kHz, which is suitable for use in an apparatus carried on a person, such as an ID card, a commuter pass and a coupon ticket. (Specification, page 1, lines 4-8)

The antenna is thin and flexible, has a low loss at high frequency, and is insignificantly affected by coins or aluminum foil such as that used for cigarette packaging. (Specification, page 2, lines 15-16)

An antenna for a transponder in accordance with a first embodiment of the present invention comprises a magnetic core 4 composed of layered rectangular metallic thin plates, and a coil 5 wound parallel to a greater dimension of the magnetic core. (Fig. 1; Specification, page 5, line 19 to page 6, line 4)

Because the magnetic core in such an antenna for a transponder is composed of layered metallic thin plates, the antenna is thin and flexible, and has a decreased high-frequency loss. By winding a coil in parallel with a larger dimension of the magnetic core, the loss is significantly decreased at a high frequency region over a few dozen kHz. (Specification, page 6, lines 5-17)

When the antenna for the transponder is mounted in a transponder, the magnetic flux flows parallel to the transponder's plane. Thus, the magnetic flux is barely affected by a coin or aluminum foil overlapped on the transponder's plane. (Specification, page 6, lines 6-8)

A transponder in accordance with a second embodiment of the present invention has two plate antennas 6, 7, each comprising a magnetic core composed of layered metallic thin plates wound with a conductor coil, and an air-core antenna composed of a spirally wound conductor. (Figs. 4A-

4B; Specification, page 6, line 22 to page 8, line 9)

An antenna for a transponder in accordance with a third embodiment of the present invention comprises a plate magnetic core composed of a composite material of a soft magnetic flake and a synthetic resin, and a coil wound on such a magnetic core. (Specification, page 8, line 10 to page 9, line 22)

Such an antenna for a transponder is thin and flexible and has a decreased high-frequency loss, because the magnetic core is composed of a composite material such as a soft magnetic flake and a synthetic resin. (Specification, page 10, lines 1-3)

When the antenna for the transponder is fabricated in a transponder, the magnetic flux flows parallel to the transponder plate. Thus, the magnetic flux is barely affected by a coin or aluminum foil overlapped on the transponder plate.

A transponder in accordance with a fourth embodiment of the present invention comprises two plate antennas 26, 27 in accordance with the third embodiment set forth above, and an air-core antenna composed of a spirally wound conductor 29. (Figs. 7A-7B; Specification, page 10, line 4 to page 11, line 4)

VII. THE ISSUES

The issues before the Board in this appeal are as follows:

1. Whether the invention, as recited in claims 1-5, 8-11, 19-29 and 36 on appeal, is unpatentable over **D'Hont** in view of **Wennerberg**, **Spears** or **Fujimoto et al.**;
2. Whether the invention, as recited in claims 12, 14, 15, 17 and 19 on appeal, is unpatentable over **Stevens et al.** in view of **Takizawa et al.** and **D'Hont**; and
3. Whether the invention, as recited in claims 32-35 on appeal, is unpatentable over

D'Hont in view of **Stevens et al.** and **Takizawa et al.**

VIII. GROUPING OF THE CLAIMS

Claims 1-5, 8-11, 19-29 and 36 on appeal should stand or fall together because similar patentability arguments will be presented below for both of independent claims 1 and 19 on appeal.

Claims 12, 14, 15, 17, 18 and 32-35 on appeal should stand or fall together because similar patentability arguments will be presented below for both of independent claims 12 and 32.

XI. ARGUMENT WITH RESPECT TO THE ISSUES

A. THE REFERENCES

The Examiner relied upon six (6) prior art references in the final rejection of the claims on appeal under 35 USC §103(a), as discussed below.

D'Hont discloses a flat, flexible antenna to be incorporated into a badge or similar object. Fig. 6 shows a coil 38 spirally wound on a strip of wires 36. Fig. 7 shows the wires being formed into several separate stacks of flat strips 42, 44, 46 and 48.

Wennerberg discloses a magnetic antenna apparatus having a solid ferrite core and a set of windings 11 parallel to the shorter rectangular dimension of the solid ferrite core and a set of windings 12 parallel to the longer rectangular dimension of the solid ferrite core.

Spears discloses a loop antenna coil 22 wrapped around the longer dimension of a closed rectangularly-shaped magnetic core loop.

Fujimoto, et al. discloses a magnetic antenna using a solid magnetic core with two square-shaped apertures 8,8'. A "pumping coil 12" is wound on the part of the core between apertures 8 and 8'.

Stevens, et al. discloses a radio broadcast communication system with multiple loop antennas, specifically a loop air core antenna 46 having an axis perpendicular to ferrite core antenna 48.

Takizawa, et al. discloses a broadcasting wave reception antenna have a magnetic core having multiple radial projections extending on a common plane, and respective projections are provided with coils wound on them.

B. SUMMARY OF EXAMINER'S REJECTIONS

Claims 1-5, 8-11, 19-20 and 36 on appeal were finally rejected under 35 USC §103(a) as being unpatentable over D'Hont in view of Wennerberg, Spears or Fujimoto et al.

Regarding claims 1, 3-6, 8, 19, 20 and 36, the Examiner urged that D'Hont shows, for example, in Fig. 7, a transponder antenna with magnetic core composed of layered, rectangular "thin" plates 42A-D of amorphous magnetic material (made of magnetic particles of soft iron or flakes as claimed within a synthetic resin) which may be oxidized (as taught in col. 4, lines 30-35) so as to be insulated as recited. The Examiner admitted that D'Hont fails to teach, mention or suggest any winding of the coil in a parallel direction to the long side of the rectangle. However, the Examiner cited the secondary references to show such obviousness, where Wennerberg shows coil 12 arranged on rectangular core 10, Spears shows, in Fig. 4, a coil wound about the core 21, and Fujimoto et al. shows a portion of the coil between terminals 12 parallel to the long sides of the rectangular core 7. The Examiner urged that it would have been obvious to employ such a directional winding in D'Hont for the purpose of maximizing directional characteristics of a particular geometrical core antenna. The Examiner noted that shape and winding and the direction of the winding are all obvious design considerations. As to claims 2 and 36, the Examiner urged that

badges, cards or flexible sheets (col. 1, lines 15-17) are deemed to have corners that are rounded, and reduced at any angle for the purpose of convenience. Regarding claims 7, 9-11 and 21-29, the Examiner urged that **D'Hont** teaches various dimensions and compositions for the elements and is evidence of obviousness that such dimensions and compositions are design expedients dependent upon a particular antenna design and efficiency in the system. The Examiner urged that specific dimensions and compositions claimed are obvious to the skilled artisan and notice of such was thereby taken by the Examiner. The Examiner urged that frequency of operation would be obvious to a specific design of the skilled artisan and dependent upon frequency allocation of the particular transponder system.

Claims 12, 14, 15, 17 and 18 on appeal were rejected under 35 USC §103(a) as being unpatentable over **Stevens et al.** in view of **Takizawa et al.** and **D'Hont**.

Regarding claims 12, 14, 15, 17 and 19, the Examiner urged that **Stevens et al.** shows a transponder system with a spiral, air-cored loop 46 and ferrite loop antenna 48 disposed on a common substrate 34. The Examiner admitted that **Stevens et al.** shows only one magnetic core antenna, where its axis is perpendicular to the air core loop antenna 46. However, the Examiner cited **Takizawa et al.** as evidence of obviousness and as resolving the level of ordinary skill in the antenna art and shows a plurality of magnetic core antennas, where at least two are perpendicular to each other. The Examiner urged that it would have been obvious to the skilled artisan to pluralize the single magnetic core antenna of **Stevens et al.** according to **Takizawa et al.** in order to provide omnidirectional coverage. The Examiner further urged that it would have been obvious to employ the magnetic core antenna of **D'Hont** in the primary reference devices for the purpose of improving efficiency by reducing eddy currents.

Claims 32-35 on appeal were rejected under 35 USC §103(a) as unpatentable over **D'Hont**

in view of Stevens et al. and Takizawa et al.

The Examiner urged that it would have been obvious to the skilled artisan to employ the transponder arrangement of Stevens et al. employing the D'Hont antenna along with an air core, spiral antenna and including a plurality of magnetic core antennas taught by Takizawa et al., effectively pluralizing the D'Hont antenna for system use.

C. APPELLANTS' ARGUMENT

The combination of D'Hont and Wennerberg, Spears or Fujimoto et al. fails to teach, mention or suggest the elements arranged as recited in claims 1-5, 8-11, 19-29 and 36 on appeal.

It is a basic tenet of patent law that to justify the use of a particular combination of prior art references to find a claim unpatentable, there must be a showing that the references themselves embody the specific claimed combination. This teaching was affirmed by the PTO U.S. Patent & Trademark Office Board of Patent Appeals and Interferences in Ex parte Clapp, 227 USPQ 972 (P.T.O. Bd. Pat. App. Int. 1985). This principle embodies the same concept propounded by the Court of Appeals for the Federal Circuit in that, not only must there be a teaching in the prior art of the structural elements of appellant's claimed invention, the prior art itself must actually suggest that the structural elements be combined in a similar manner as the claimed invention. See, e.g., Panduit Corp. v. Dennison Mfg. Co., 774 F.2d 1082, 227 USPQ 337 (Fed. Cir. 1985), **vacated on other grounds**, Dennison Mfg. Co. v. Panduit Corp., 475 U.S. 809, 229 USPQ 478 (1986).

D'Hont discloses a flat, flexible antenna to be incorporated into a badge or similar object. Fig. 6 shows a coil 38 spirally wound on a strip of wires 36. Fig. 7 shows the wires being formed into several separate stacks of flat strips 42, 44, 46 and 48.

Wennerberg discloses a magnetic antenna apparatus having a solid ferrite core and a set of windings 11 parallel to the shorter rectangular dimension of the solid ferrite core and a set of windings 12 parallel to the longer rectangular dimension of the solid ferrite core.

Spears discloses a loop antenna coil 22 wrapped around the longer dimension of a closed rectangularly-shaped magnetic core loop.

Fujimoto, et al. discloses a magnetic antenna using a solid magnetic core with two square-shaped apertures 8,8'. A "pumping coil 12" is wound on the part of the core between apertures 8 and 8'.

The several stacks of flat strips 42, 44, 46, and 48 in the magnetic core of **D'Hont** teaches away from the present invention in which there is only a single stack of rectangular thin plates, as recited in claim 1 of the present invention.

Furthermore, **D'Hont** fails to teach, mention or suggest any relationship of the orientation of the coil and the dimensions of the rectangular flat plates forming the core, as recited in claims 1 and 19 on appeal.

None of the other cited references teaches, mentions, or suggests that the magnetic core consists of a single stack of flat plates, as recited in claims 1 and 19 on appeal.

Thus, the 35 USC §103(a) rejection is improper and should be withdrawn.

The combination of Stevens et al. in view of Takizawa et al. and D'Hont fails to teach, mention or suggest the elements argued as recited in claims 12, 14, 15, 17 and 18 on appeal.

Stevens, et al. discloses a radio broadcast communication system with multiple loop antennas, specifically a loop air core antenna 46 having an axis perpendicular to ferrite core antenna 48.

Takizawa, et al. discloses a broadcasting wave reception antenna have a magnetic core having multiple radial projections extending on a common plane, and respective projections are provided with coils wound on them.

None of the references teaches, mentions or suggests, three antennas having mutually perpendicular axes, as recited in claims 12 and 32 on appeal.

Despite the Examiner's arguments to the contrary, the combination of the cited references teaches only pairs of antennas having mutually perpendicular axes, and cannot be said to teach, mention, or suggest any arrangement of three (3) antennas having mutually perpendicular axes, as recited in claims 12 and 32 on appeal.

Thus, the §103(a) rejection is improper and should be withdrawn.

The combination of D'Hont, Stevens et al. and Takizawa et al. fails to teach, mention or suggest the elements arranged as recited in claims 32-35 on appeal.

As noted above, this combination of references fails to teach, mention, or suggest three (3) antennas having respective axes which are mutually perpendicular to one another, as recited in claim 32.

Thus, the §103(a) rejection is improper and should be withdrawn.

X. CONCLUSION


For the foregoing reasons, the Board of Patent Appeals and Interferences is therefore respectfully requested to reverse the 35 USC §103(a) rejections of claims 1-5, 8-12, 14, 15, 17-29 and 31-36 on appeal.

In the event this paper is not timely filed, Appellant hereby petitions for an appropriate

extension of time. The fee for any such extension may be charged to our Deposit Account No. 01-2340, along with any other additional fees which may be required with respect to this paper.

Respectfully submitted,

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Group Art Unit: **2821**

Examiner: **M. Wimer**

CLAIMS ON APPEAL

The claims on appeal are claims 1-5, 8-12, 14, 15, 17-29 and 31-36, presented below.

1. An antenna for a transponder comprising a magnetic core composed of a single stack of rectangular metallic thin plates, and a coil wound on said magnetic core parallel to a greater rectangular dimension of said magnetic core.

2. An antenna for a transponder according to claim 1, wherein corners of said thin plates are rounded.

3. An antenna for a transponder according to claim 1, wherein said thin plates comprise an amorphous magnetic material.

4. An antenna for a transponder according to claim 1, wherein the thickness of each one of said thin plates is 20 to 50 μm .

5. An antenna for a transponder according to claim 1, wherein said magnetic core comprises three to sixteen of said thin plates.

8. An antenna for a transponder according to claim 1, wherein said thin plates are insulated from one another by oxidizing each of their surfaces.

9. An antenna for a transponder according to claim 1, wherein the diameter of a conductor comprising said coil is 100 to 200 μm .

10. An antenna for a transponder according to claim 1, wherein the thickness of the antenna is 0.4 mm or less.

11. An antenna for a transponder according to claim 1, wherein said antenna for a transponder is a size suitable for use as at least one of an ID card, a commuter pass and a coupon ticket which operates at a frequency of 40 to 200 kHz.

12. A plate transponder comprising two plate antennas composed of a wound conductor on a magnetic core composed of layered metallic thin plates, and in air-core antenna composed of a spirally wound conductor,

wherein said two plate antennas and said air-core antenna have respective axes which are mutually perpendicular to one another.

14. A transponder according to claim 12, wherein said two plate antennas are provided in

the plate transponder so that the axes of said coils are perpendicular to each other, and said air-core antenna composed of the spirally wound conductor is provided in the plate transponder so that the axis thereof is perpendicular to the transponder plate.

15. A transponder according to claim 12, wherein a magnetic recording layer is provided on the surface of the transponder, and antennas are provided inside the transponder.

17. A transponder according to claim 12, wherein embossment is formed on sections other than said antennas, complimentary circuits, and a magnetic recording layer.

18. A transponder according to claim 12, wherein said transponder is a size suitable for use as at least one of an ID card, a commuter pass and a coupon ticket which operates at a frequency of 40 to 200 kHz.

19. An antenna for a transponder comprising a rectangular plate magnetic core comprising a single stack of rectangular metallic thin plates, each plate composed of a composite material of soft magnetic flakes and a synthetic resin, and a coil wound on said magnetic core perpendicular to a greater rectangular dimension of the magnetic core.

20. An antenna for a transponder according to claim 19, wherein the soft magnetic material composing each one of said flakes is selected from the group consisting of pure iron, silicon steel, a permalloy and an iron/cobalt amorphous alloy.

21. An antenna for a transponder according to claim 20, wherein the soft magnetic material composing each one of said flakes is a cobalt amorphous alloy.

22. An antenna for a transponder according to claim 19, wherein each one of said flakes has a thickness of 30 μm or less and a diameter of 50 to 2,000 μm .

23. An antenna for a transponder according to claim 19, wherein each one of said flakes has a thickness of 10 μm or less and a diameter of 100 to 1,000 μm .

24. An antenna for a transponder according to claim 19, wherein said synthetic resin is selected from the group consisting of thermoset resins, including epoxy resins, phenol resins, urea resins, unsaturated polyester resins, diacrylphthalate resins, melamine resins, silicone resins, and polyurethane resins; and thermoplastic resins, including polyethylene resins, polypropylene resins, vinyl chloride resins, fluoroplastics, methacrylate resins, polystyrene resins, AS resins, ABS resins, ABA resins, polycarbonate resins, polyacetal resins, and polyimide resins.

25. An antenna for a transponder according to claim 19, wherein the amount of said synthetic resin in the composite material is 3 to 50 % by weight.

26. An antenna for a transponder according to claim 19, wherein said flake comprises a cobalt base amorphous alloy, said synthetic resin is an epoxy resin, and the amount of said synthetic resin in the composite material is 10 to 40 % by weight.

27. An antenna for a transponder according to claim 19, wherein said magnetic core has a thickness of 0.3 to 1 mm, a width of 10 to 25 mm and a length of 60 to 80 mm.

28. An antenna for a transponder according to claim 19, wherein said magnetic core has a thickness of 0.3 to 1 mm, a width of 10 to 25 mm and a length of 60 to 80 mm.

29. An antenna for a transponder according to claim 19, wherein the diameter of a conductor comprising said coil is 100 to 200 μm .

31. An antenna for a transponder according to claim 19, wherein said antenna for a transponder is a size suitable for use as at least one of an ID card, a commuter pass and a coupon ticket which operates at a frequency over 100 kHz.

32. An transponder comprising two plate antennas set forth in claim 19, and an air-core antenna composed of a spirally wound conductor,

wherein said three antennas have respective axes which are mutually perpendicular to one another.

33. A transponder according to claim 32, wherein the axes of said two or three antennas are perpendicular to each other.

34. A transponder according to claim 32, wherein said two plate antennas are provided in the plate transponder so that the axes of said two coils are perpendicular to each other, and said

air-core antenna composed of the spirally wound conductor is provided in the plate transponder so that the axis thereof is perpendicular to the transponder plate.

35. A transponder according to claim 32, wherein said antenna for a transponder is a size suitable for use as at least one of an ID card, a commuter pass and a coupon ticket which operates at a frequency over 100 kHz.

36. The antenna for a transponder according to claim 1, wherein each corner of said thin plates is reduced to form an oblique angle.